# Mohammad Sadra **Heydari**

Ph.D. student in Economics @ Adam Smith Business School (University of Glasgow)

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## Education

**Ph.D. in Economics** — Oct 2025 – Aug 2028 (expected)
University of Glasgow — Adam Smith Business School
**Research title:** *Strategic Interaction in Industry Dynamics*

**MRes in Economics (with Distinction)** — Sep 2023 – Dec 2025
University of Glasgow — Adam Smith Business School — *GPA: 19.9/22*
**Dissertation Title:** *Endogenous R&D Network Formation with Heterogeneous Firms.*

**B.Sc. in Computer Engineering (Minor in Economics)** — Sep 2018 – Jun 2023
Sharif University of Technology — Department of Computer Engineering — *GPA: 17.02/20.0*

### Additional Certificates:

(2024) **Summer School on Social Choice & Fair Division**, *Tehran Economic Policy Think Tank* [*Certificate*]

## Research Experience

**Knowledge Disclosure and Endogenous R&D Network Formation** — Mar 2024 - Present
Supervisors: Dr. *Zafer Kanik* and Dr. *Santiago Montoya-Blandón*.

- Developed a novel endogenous R&D network formation model, incorporating firms with varying productivity levels.
- Demonstrated that large productivity gaps lead to stability of Positive Assortative networks, in contrast with the classical results in the literature, while smaller gaps favor the stability of Complete network structures.

**Satellite Imagery in Neighborhood-level Socio-economic Stratification** — Sep 2024 - Present
Supervisor: Dr. *Santiago Montoya-Blandón*.

- Utilizing existing ML models to score urbanization using satellite imagery to use them in Medellin, Colombia.
- Assessing the quality of the neighborhood stratification done by the local government, and evaluating the extent to which geographical stratification represents socio-economic ranking and clustering utilized by public policy-makers.

**Mobility and Household Income Dynamics in Iran** — May 2021 - Dec 2022
Supervisor: Dr. *Naser Amanzadeh*.

- Utilized Absolute Intra-generational Income Mobility (AIIM) as an additional measure to traditional income distribution indices, providing a clearer view of economic conditions by highlighting household income dynamics.
- Estimated AIIM for urban households in Iran from 2011 to 2019 using cross-sectional data, and extended these estimates backward to 1991 by leveraging copula distributions and models.

## Publication

**Absolute Intragenerational Income Mobility in Iran (2023)** [Link]
*Amanzadeh, N. and Heydari, M.S., The Quarterly Review of Economics and Finance. 90: 38-50.*

## Honors and Awards

2023 **Economics Scholarship (2+3)** *Adam Smith Business School; University of Glasgow* — Glasgow, UK
2021 **Best Paper** *4th Iran Economic Forum; Tehran Institute for Advanced Studies (TeIAS)* — Tehran, Iran
2018 **Silver Medal** *12th International Olympiad on Astronomy and Astrophysics (IOAA)* — Beijing, China
2017 **Gold Medal** *13th National Astronomy and Astrophysics Olympiad* — Tehran, Iran

## Skills

**Programming Language:** Python (*advanced*), Java (*advanced*), C / C++, SQL.

**Statistical Programming Languages:** R (*advanced*), Stata, MatLab & Octave, Julia.

**Tools and Software:** MS Excel, LaTeX, Jupyter NB / G Colab, Git / GitHub, Dynare, ArcGIS, Gephi, Vensim.

**Language:** Farsi/Persian (*native*), English (*fluent - IELTS: 8.0*).

## Selected Courses

### Adam Smith Business School (University of Glasgow)*

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|---|---|---|---|---|---|
| Econometrics I | (*18/22*) | Mathematical Methods | (*20/22*) | Macroeconomics of Inequality | (*19/22*) |
| Econometrics II | (*22/22*) | 1st Year Research Project | (*21/22*) | Bayesian Data Analysis | (*22/22*) |
| Macroeconomics | (*20/22*) | Topics in Applied Microeconomics | | Industrial Organization | (*21/22*) |
| Microeconomics | (*18/22*) | (Behavioural Economics) | (*21/22*) | Computational Macro | (*20/22*) |

### Sharif University of Technology

| *Economics Courses* | | *Mathematical Courses* | | *Data-oriented Courses* | |
|---|---|---|---|---|---|
| Econometrics | (*19.6/20*) | Probability & Statistics | (*20.0/20*) | Advanced Programming | (*19.3/20*) |
| Intro to Macroeconomics | (*19.9/20*) | Linear Algebra | (*16.7/20*) | Artificial Intelligence | (*19.9/20*) |
| Intro to Microeconomics | (*17.8/20*) | Differential Equations | (*17.8/20*) | Machine Learning* | (*16.5/20*) |
| Game Theory* | (*20.0/20*) | Numerical Computation | (*17.4/20*) | Database Design | (*16.6/20*) |
| Industrial Organization | (*17.3/20*) | Discrete Structures | (*17.5/20*) | Computer Simulation | (*19.7/20*) |

### Audited and Online Courses

Using Big Data to Solve Social and Economic Problems (*Harvard*), Natural Language Processing with Deep Learning (*Stanford*), Macroeconomics I*, II* (*Sharif*), Microeconomics I* (*Sharif*)

*: Graduate-level Course

## Teaching Experience

**Graduate Teaching Assistant** Adam Smith Busines School — University of Glasgow

- *Econometrics 1*: Fall 2025

**Teaching Assistant** Sharif University of Technology

- *Probability & Statistics*: Fall 2020, Spring 2021
- *Data Structure & Algorithm*: Spring 2021
- *Introduction to Macroeconomics*: Spring 2021
- *Game Theory*: Fall 2021*, Spring 2021

*: Graduate-level Course

## Work Experience

**Junior Data Scientist** | *Metodata* Jan 2022 - Sep 2022

Collaborated under the supervision of Dr. *Meysam Alizadeh*.

- Household financial transaction pattern analysis and anomaly detection
  - Collaborated on a joint project with the ***Central Bank of Iran*** and the ***Ministry of Labour and Social Welfare*** by analyzing 100 million transactions from a 100,000-sample of Iranian households.
  - Utilized pattern recognition algorithms based on category, time, and paid amount to identify irregular transactions.
  - Engineered a model achieving 85% accuracy in detecting irregularities based on macro socio-economic features.
- Public opinion and brand awareness analysis using social media platforms using NLP
  - Conducted data collection on social media platforms (e.g. Twitter, Instagram, Telegram, Facebook) based on client-specified keywords using available APIs and crawling libraries.
  - Analyzed user satisfaction and public opinion using NLP models and algorithms, e.g. LDA modeling, sentiment analysis and prediction models, bot detection models, etc.
  - Utilized graph/network analysis to identify communication clusters on the information propagation network, and to pinpoint influential users using centrality indices.
- Hotel demand prediction for a private booking company
  - . Analyzed user activities and reservation data for monthly demand prediction.
  - . Constructed a comprehensive dataset, including economic, social, and political factors.
  - . Developed a time-series forecasting model for provincial accommodation requests.

**Data Engineer Intern** | *Institute for Research in Fundamental Sciences (IPM)* Jun 2020 - Sep 2020

Contributed to the R&D team of Iran's National Observatory (INO) project.

- Weather station data pipe-line and data analysis
  - . Established a data-cleaning pipeline for the weather report system, handling sensor data reception, filtering, storage, and real-time visualization of station status.
  - . Developed a model to detect clouds in night sky images captured by the all-sky camera deployed at the station.
- Night-sky cloud prediction.
  - . Developed a model to detect clouds in night sky images captured by the all-sky camera, by identifying visible stars.

## Selected Course Projects

**Regression with Many Predictors** | *MRes Econometrics Project* [Link]

- Constructed diverse data-generating processes with multicollinearity and autoregression features.
- Applied Information Theoric Model Averaging (ITMA), PCA regression, and Lasso regression to assess their performance.
- Evaluated bias in coefficient estimation and the ability to eliminate irrelevant covariates.
- Concluded ITMA's superior performance, especially in eliminating irrelevant variables, particularly with low error variance.

**Intergenerational Income Mobility for Iran 1984-1990** | *B.Sc. Econometrics Project* [Link]

- Utilized marginal distributions of income per capita from the Iranian Expenditure and Income Survey (HEIS) since 1984.
- Constructed a pseudo-panel incorporating geographical and demographic features of the households.
- Evaluated the percentage of children with higher income than their parents, focusing on those born between 1984 and 1990.

**Effect of Class Size on Student's Exam Results** | *B.Sc. Econometrics Project* [Link]

- Inspired by the second empirical project from the online course *"Using Big Data to Solve Social and Economic Problems,"* instructed by *Chetty, R.* in 2019 at Harvard University.
- Utilized the regression discontinuity design (RDD) to assess the impact of class size on fifth-grade students' performance in math and literature exams, using the data from Israel's schools in 1992.

## References


**Dr. Richard Dennis** webpage
richard.dennis@glasgow.ac.uk
Professor in Economics at Adam Smith Business School, University of Glasgow

**Dr. Zafer Kanık** webpage
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Assistant Professor in Economics at Adam Smith Business School, University of Glasgow

**Dr. Naser Amanzadeh** webpage
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